CLAIMS

What is claimed is:

1. In a piston pump having a housing defining an internal cavity in which is disposed a cylinder defining a cylindrical passage in which a head of a piston reciprocates to vary the volume of a working chamber of the cylinder, the improvement wherein the cylinder has a leak opening providing communication between the working chamber and an ambient atmospheric pressure during at least a portion of a piston stroke.

2. The improvement of claim 1, wherein the leak opening is located such that it is between the piston head and the valve head for the majority of the piston stroke.

3. The improvement of claim 2, wherein the leak opening is located proximate to a top end of the cylinder.

4. The improvement of claim 3, wherein the leak opening is located at less than about 0.2 inches from the top end of the cylinder.

5. The improvement of claim 4, wherein the piston head includes a cup seal slideably mating with an inner diameter of the cylinder and wherein a center of the leak opening is located no more than about 0.1 inches below the piston cup seal when the piston is at top dead center.

6. The improvement of claim 5, wherein the center of the leak opening is about 0.05 inches above the piston cup when the piston is at top dead center.

7. The improvement of claim 1, wherein the leak opening is less than about 0.1 inches in diameter.

8. The improvement of claim 7, wherein the leak opening is about 0.05 inches in diameter.

9. The improvement of claim 1, wherein the piston is connected to a drive shaft extending along a shaft axis and wherein the leak opening has a centerline disposed in a plane containing the shaft axis and a centerline of the cylinder.

10. The improvement of claim 9, wherein the leak opening centerline is parallel to the shaft axis and perpendicular to the cylinder centerline.